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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,053

07/14/2006

Friedrich Boecking

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EXAMINER

REIS, RYAN ALEXANDER

ART UNIT

PAPER NUMBER

3752

MAIL DATE

DELIVERY MODE

08/04/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/586,053	Applicant(s) BOECKING, FRIEDRICH	
	Examiner RYAN REIS	Art Unit 3752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9 and 10 is/are rejected.
- 7) ☒ Claim(s) 11-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/14/2006 and 05/09/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant has amended the claims in the communications filed on 07/14/2006. Claims 1-8 have been cancelled and claims 9-28 have been added. Therefore, claims 9-28 are pending in the application and are addressed below.

Specification

2. The disclosure is objected to because of the following informalities: In the amended specification, paragraph [0021] reads "the diameter 17(d₂) of the face end 21" where the diameter "17(d₂)" is the sealing edge diameter and should not reference the diameter of the "face end 21".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of US Patent 6,502,803 to Mattes (Mattes).

As to claim 9, applicant discloses a fuel injector having a piezoelectric actuator directly actuating an injection valve member, which piezoelectric actuator acts on a

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booster piston, and a face end of the booster piston acts on a hydraulic coupling chamber for actuating the injection valve member, and the piezoelectric actuator is received in a hollow chamber in the injector housing, which hollow chamber is filled with a fuel volume that is under high pressure (Jepson claim).

Mattes discloses a fuel injector with a piezoelectric actuator (3) wherein the diameter of a sealing edge (22) in the actuator base region relates to the diameter of the booster piston (17) in that a larger diameter of the sealing edge causes a prestress on the actuator (see column 2, lines 20-25). Hence, a diameter of the sealing edge which corresponds with the diameter of the booster piston provides zero prestress on the actuator.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant's invention to have modified applicant's admission of the prior art to have the diameter of the sealing edge correspond to the diameter of the booster piston in order to have zero prestress on the actuator to achieve a balanced system.

Furthermore, (a) the admitted prior art and the Mattes reference are *known work in one of field of endeavor*, (b) such modification is merely the use of a known technique to improve a similar device by varying the diameter of the sealing edge and (c) such modification, i.e. choosing from a finite number of predictable solutions, is not of innovation but of ordinary skill and common sense. *KSR, International Co. v. Teleflex Inc.*, 550 U.S. (2007).

As to claim 10, Mattes discloses the piezoelectric actuator, on its head region, is solidly joined to the booster piston (see column 3, lines 16-20).

Allowable Subject Matter

5. Claims 11-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of reference does not disclose these limitations (along with the limitations in the claims from which they depend):

As to claims 11 and 12, the face end of the booster piston forming a larger hydraulically operative face than a face end of the injection valve member; as to claim 13, the piezoelectric actuator being surrounded by a potting material; as to claims 14-16, the hollow chamber in the injector housing surrounding the piezoelectric actuator acting on a nozzle chamber inlet extending to a nozzle chamber; as to claims 17-21, electrical terminals for supplying current to the piezoelectric actuator being guided by a threaded portion located above the actuator base region; as to claims 22-25, a sealing edge, cooperating with a beveled portion of the injector housing and the hollow chamber being filled with a fuel volume at high pressure; and as to claims 26-28, the piezoelectric actuator, above a connecting face with the booster piston, having a constricted portion.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patents 6,575,140 to Boecking and 6,892,956 to Yildirim et al. show fuel injectors with a piezoelectric actuator having the same diameter as a booster piston. US Patent 6,460,779 to Boecking shows the effects of different size diameters in a hydraulic fluid. US Patent Application Publication 2003/0085371 to Mattes shows a constricted portion above the booster piston and the booster piston face having a larger hydraulically operative face than a face end of an injection valve.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RYAN REIS whose telephone number is (571)270-5060. The examiner can normally be reached on Monday through Friday 8:00am to 6:00pm EST.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Len Tran can be reached on (571) 272-1184. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RR/

Examiner, Art Unit 3752

/Len Tran/

Supervisory Patent Examiner, Art Unit 3752